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AH-64D Apache Longbow Network Centric Operations in a Coalition Environment

73rd MORSS Conference
21-23 June 2005
U S Military Academy
West Point, NY

Dr. Sam H. Parry
The Boeing Company
Operations Analysis Dept.
Mesa, AZ

Themes, Messages and Issues

Theme

- **A combined arms coalition force enabled with interoperable network centric (enabled) technology is extremely effective on the modern battlefield, allowing force to develop situation & engage out of contact, mass effects not forces, synchronized operations.**

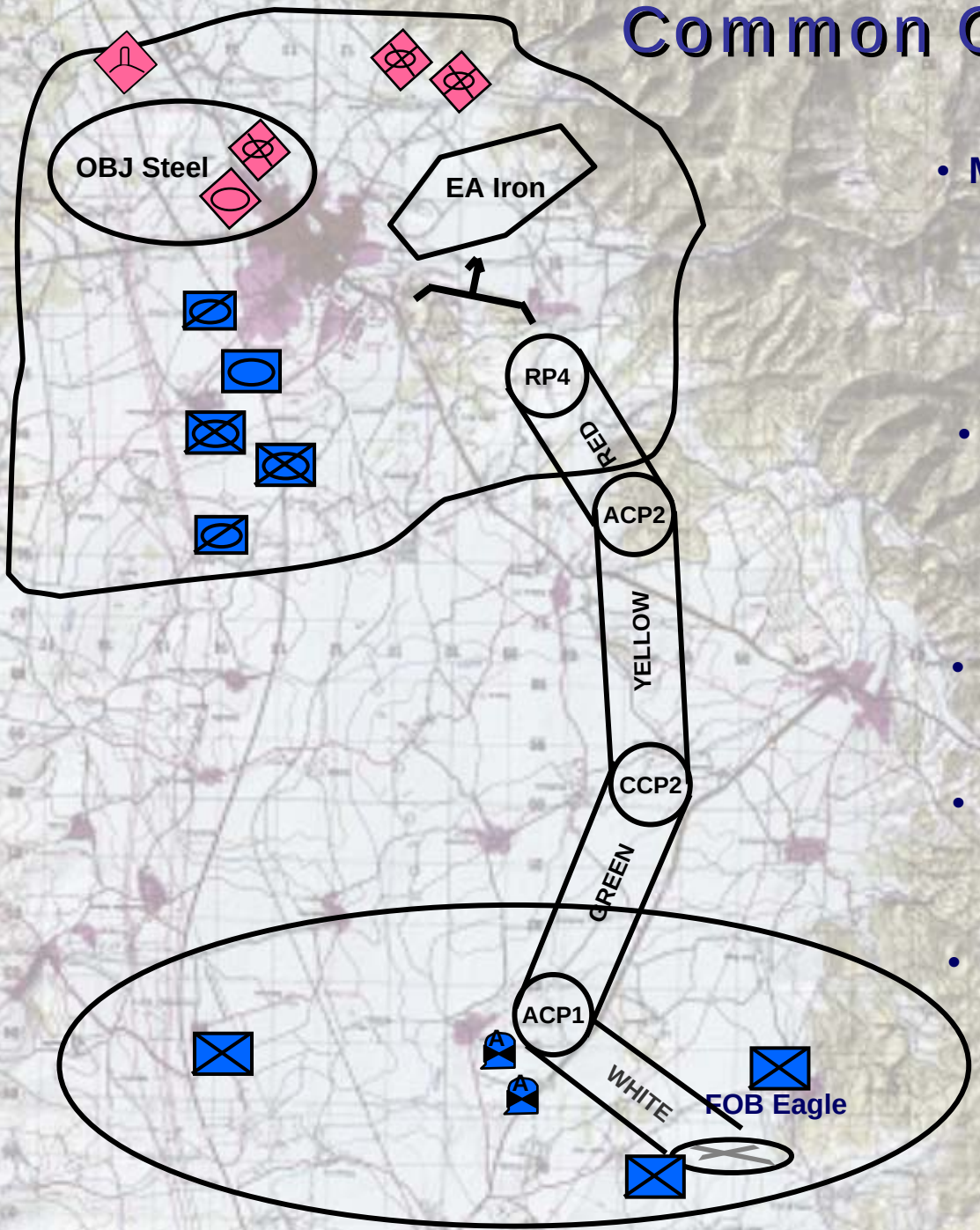
Coalition Force Messages

- **Coalition Operations are a fact of life—coalition forces will face a distributed and capable asymmetrical force**
- **A coalition force enabled with interoperable network centric communications is more effective than one without.**
  - **Lethality XX% - Survivability XX% Synchronization (speed) XX%**
- **The US Army is transforming, modernizing equipment, adapting operations and tactics to a changing operational environment**
- **Network requirements will continue to change as technology and capability are introduced to the Force.**

Modeling Issues

- **Adequacy of systemic decision algorithms in constructive simulations**
- **Complexity of analysis using interactive simulations**

Common Operational Picture



- **Maneuver Concept/Scheme - the "Plan"**
  - √ Operations
  - √ Enemy
  - √ Fire Support
  - √ A^2C^2
- **Red Situation (real-time)**
  - √ What type? How many?
  - √ Where are they?
  - √ Where are they going?
- **Blue Situation (real-time)**
  - √ What? Where? When?
- **Alerts (real-time)**
  - √ What? Where? When?
- **Logistics/Status (real-time)**
  - √ Fuel, Ammo, Maintenance
  - √ Understandable

Constructive vs. Interactive Simulation for Analysis

- **Hypothesis: Constructive decision algorithms for modeling current asymmetric environment, coupled with NCO, cannot anticipate many of the possible combat situations that may arise.**

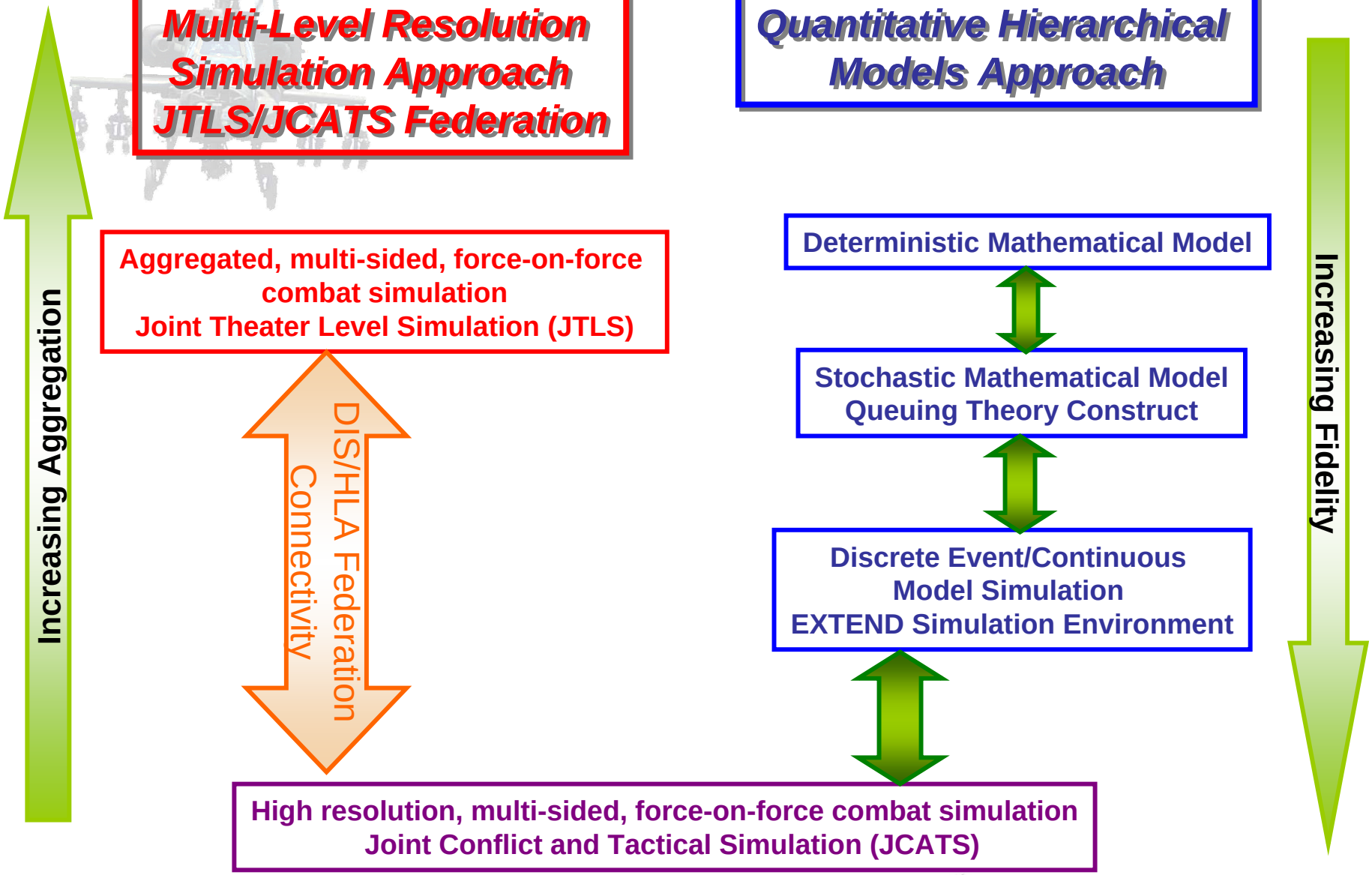
- **Historical view of constructive combat simulations:**
  - **Constructive models with no human interaction are required to eliminate human variance contribution to the outcomes.**
  - **Replications to achieve statistical confidence accomplished by changing random number seeds**
  - **Assumes decision algorithms adequately emulate some set of human decision-makers**

- **Historical view of interactive combat simulations:**
  - **Interactive models are primarily used for training**
  - **Not appropriate for analysis because of human variance component**

- **Proposed view of interactive combat simulations for comparative analysis:**
  - **Use carefully selected set of human decision makers (as well as random number seeds for physical processes) to achieve replication**
  - **Explicitly measure human variation contribution to the experimental design error budget**
  - **Obtaining the appropriate subset of human decision-makers for interactive analysis no more difficult than the subset required for building the systemic decision algorithms**

- **Trade-off between degree of confidence in systemic decision algorithms and complexity of analysis with human participants**

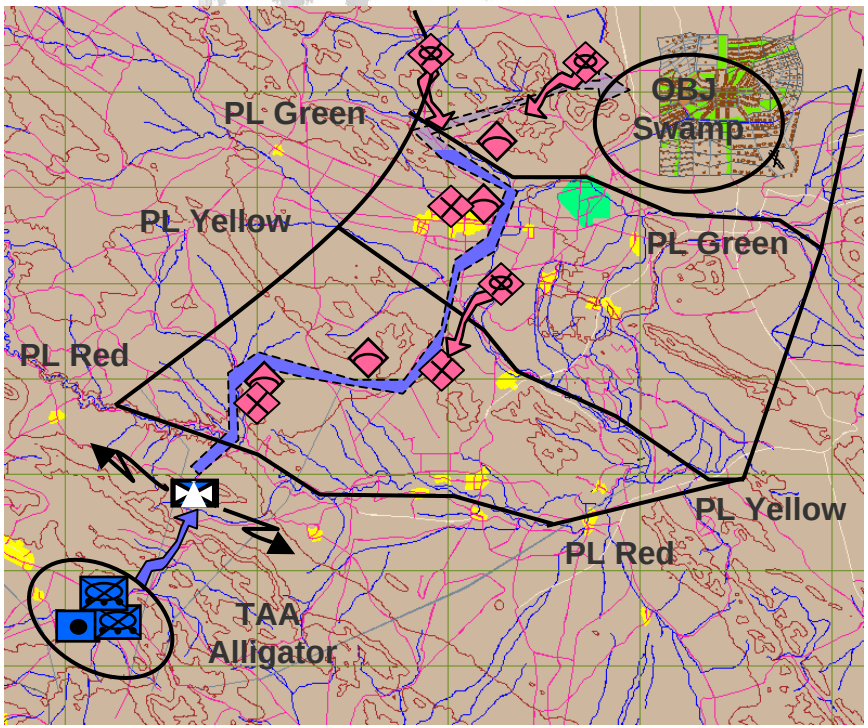
Coalition Interoperability: Methodology Roadmap



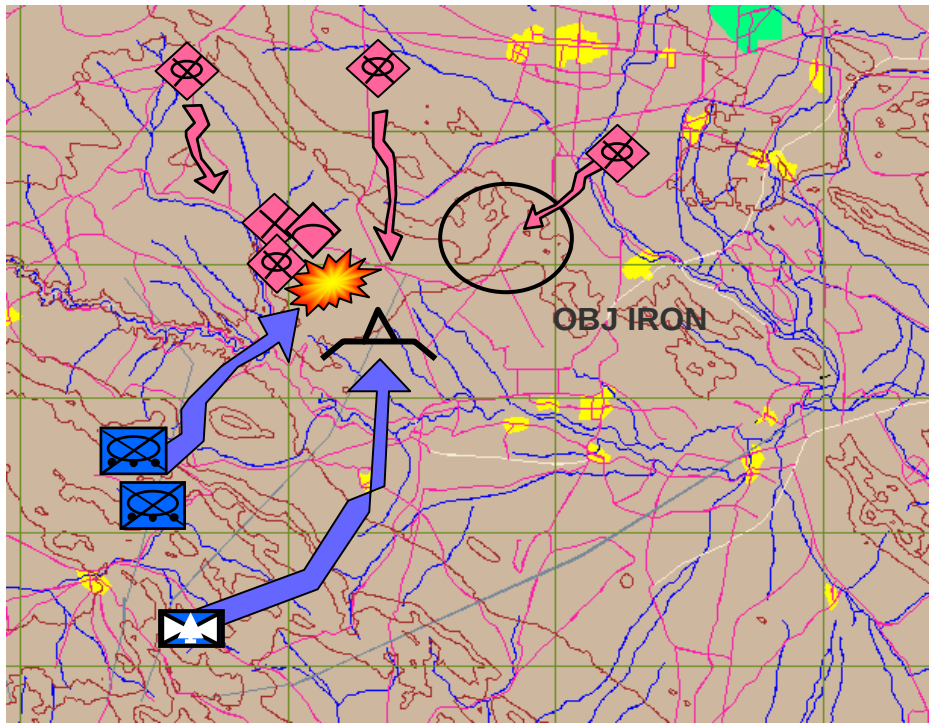
Mission Effectiveness Evaluation

Quantify The Operational Benefits of An Interoperable Network Enabled Coalition Force vs. A Non-Networked Enabled Coalition Force

Movement to Contact Scenario



Close Combat Scenario

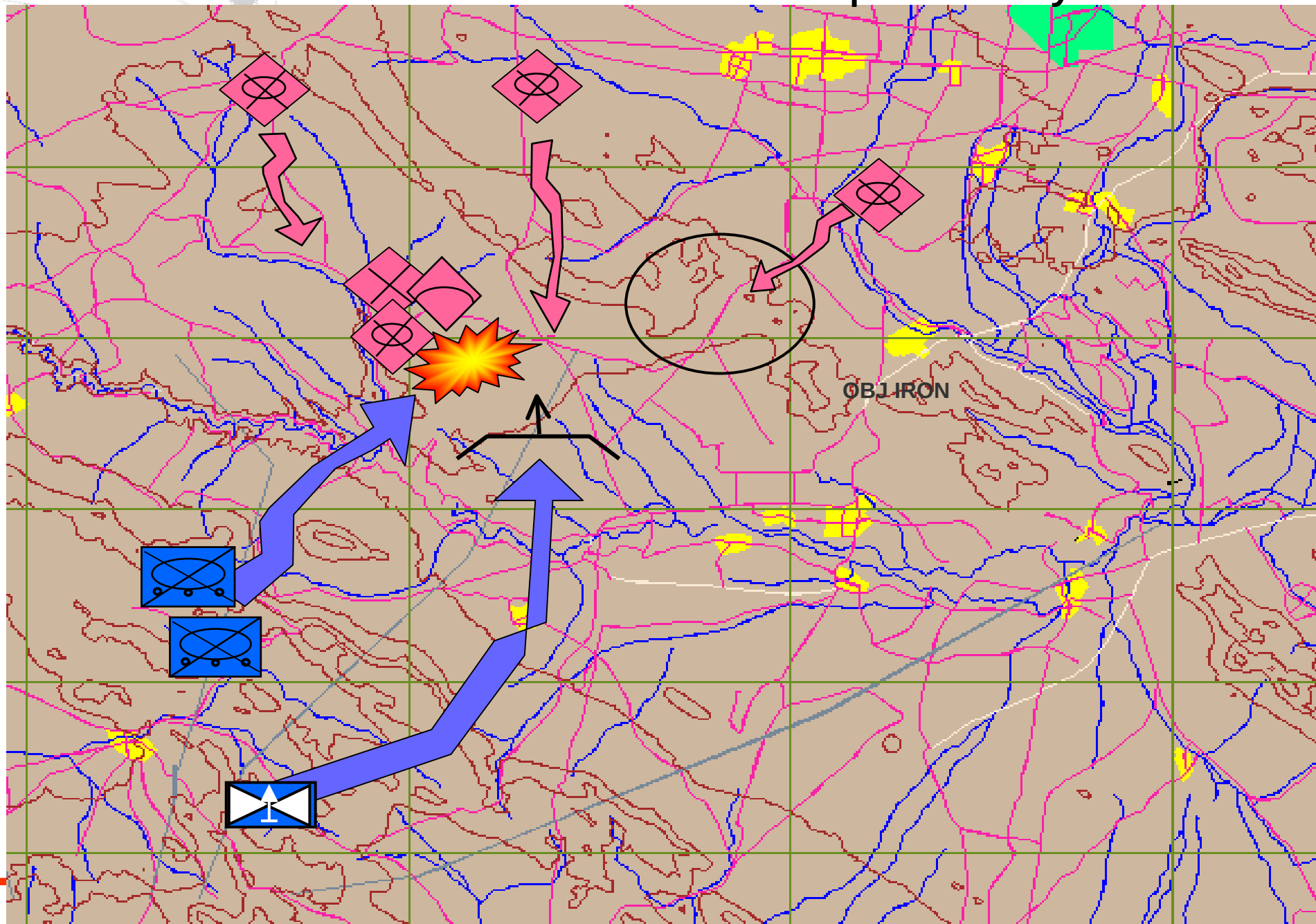


Demonstrate the Value of An Interoperable Network Enabled Force

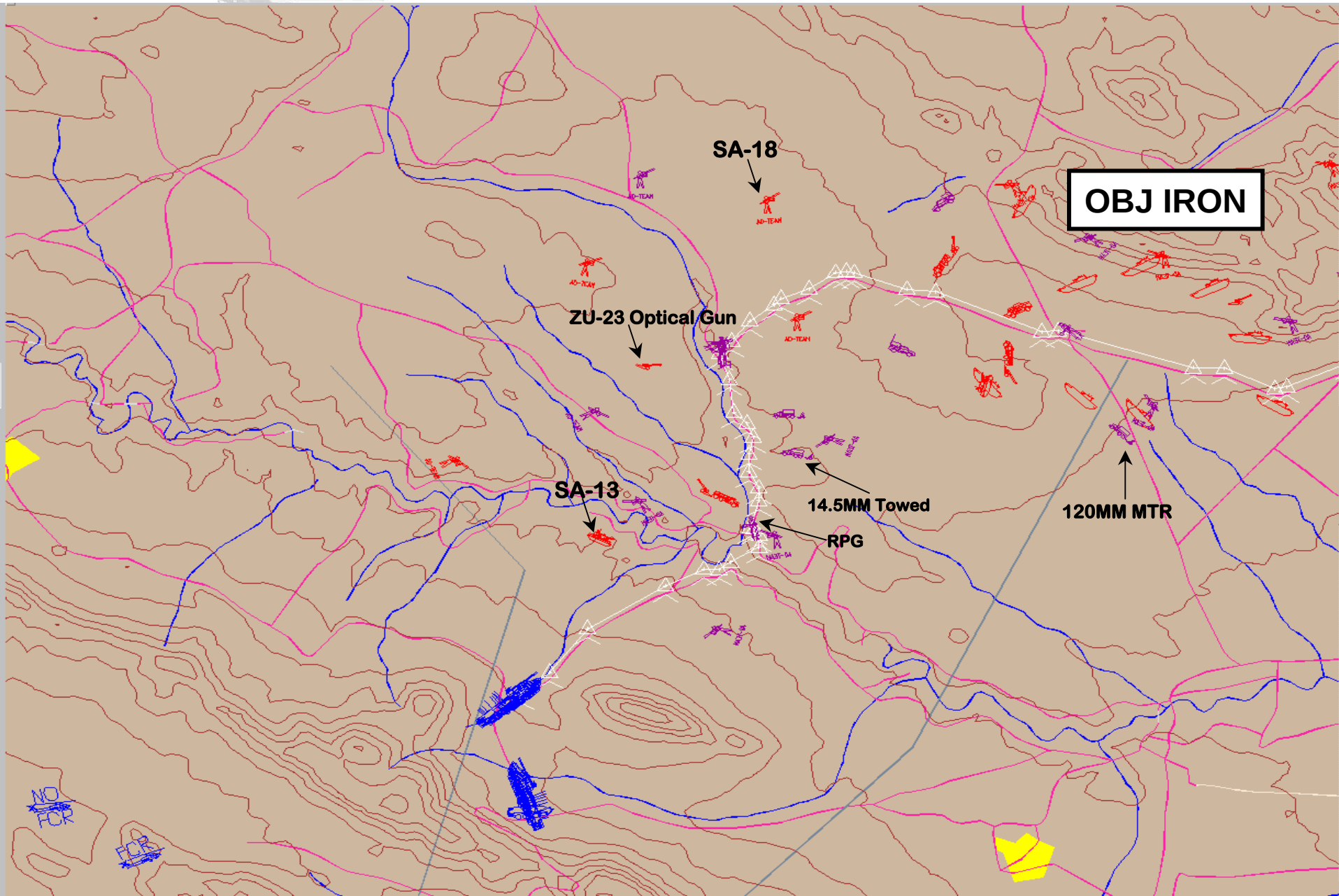
Number of Entities in COALITION Scenario

Entity Type	Number of Vehicles	Number of Infantry soldiers	Notes
Red Regulars			
BMPs (8 soldiers each)	10	80	
BMPs (8 soldiers + SA-18 each)	10	90	
ZSU 23-4	4		
ZU-23 Optical Gun	4		
2S6 (Radar)	2		Included only in radar runs
SA-13 w/radar	2		Included only in radar runs
SA-13 (Optical)	2		
152mm SP Artillery Tubes	8		Two Batteries of 4 tubes each
120mm Mortar SP	5		
Total RED	**47**	**170**	
Purple Irregulars			
Light Squads - 5 with 9 each		45	
Heavy Squads - 5 with 20 each	3	100	
Mobile Group 1-5: ZPU-2: 14.5mm ADA	5		
Mobile Group 6-10: RPG/RPK	5	10	
Irreg RPG/SA-18 extras		23	
Total Irregulars	**13**	**178**	
Blue			
AH-64D with FCR	18		JCATS has 18 to provide for one AH-64D Battalion (18 operative aircraft) with any combination of FCR/No FCR
AH-64D Without Radar	18		JCATS has 18 to provide for one AH-64D Battalion (18 operative aircraft) with any combination of FCR/No FCR
Shadow UAV	2		
Stryker Group 1:			
Stryker Mobile Gun	4	0	Mounts only 105mm gun
Stryker 50 Cal	4	36	Mounts 50 Cal Gun + 3 Rifle Squads of 9 each
Stryker MK19	4	32	Mounts MK 19 40mm + 1 Rifle Squad of 9 and 2 Weapons Squads of 7 each
Stryker Group 2:			
Stryker Mobile Gun	4	0	Mounts only 105mm gun
Stryker 50 Cal	4	36	Mounts 50 Cal Gun + 4 Rifle Squads of 9 each
Stryker MK19	4	32	Mounts MK 19 40mm + 2 Rifle Squad of 9 and 2 Weapons Squads of 7 each
Stryker Group 3:			
Stryker Mobile Gun	4	0	Mounts only 105mm gun
Stryker 50 Cal	4	36	Mounts 50 Cal Gun + 4 Rifle Squads of 9 each
Stryker MK19	4	32	Mounts MK 19 40mm + 2 Rifle Squad of 9 and 2 Weapons Squads of 7 each
Bule Artillery	8	0	2 Batteries of 155mm SP available
Total Blue Ground	**44**	**204**	
Blue Mortars (8 - 81mm Mortar teams available)		32	**Not Currently Used**

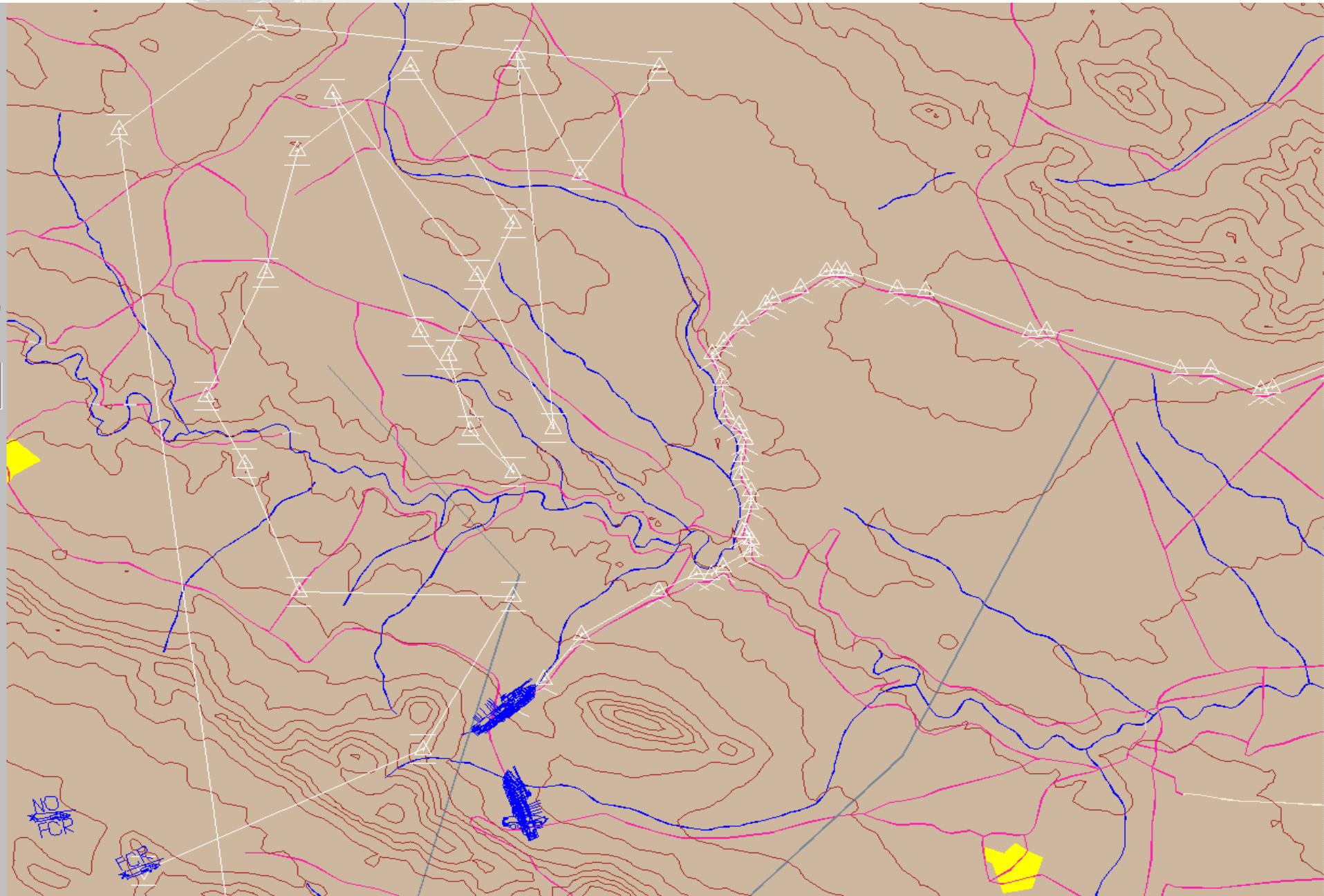
Coalition Network Interoperability

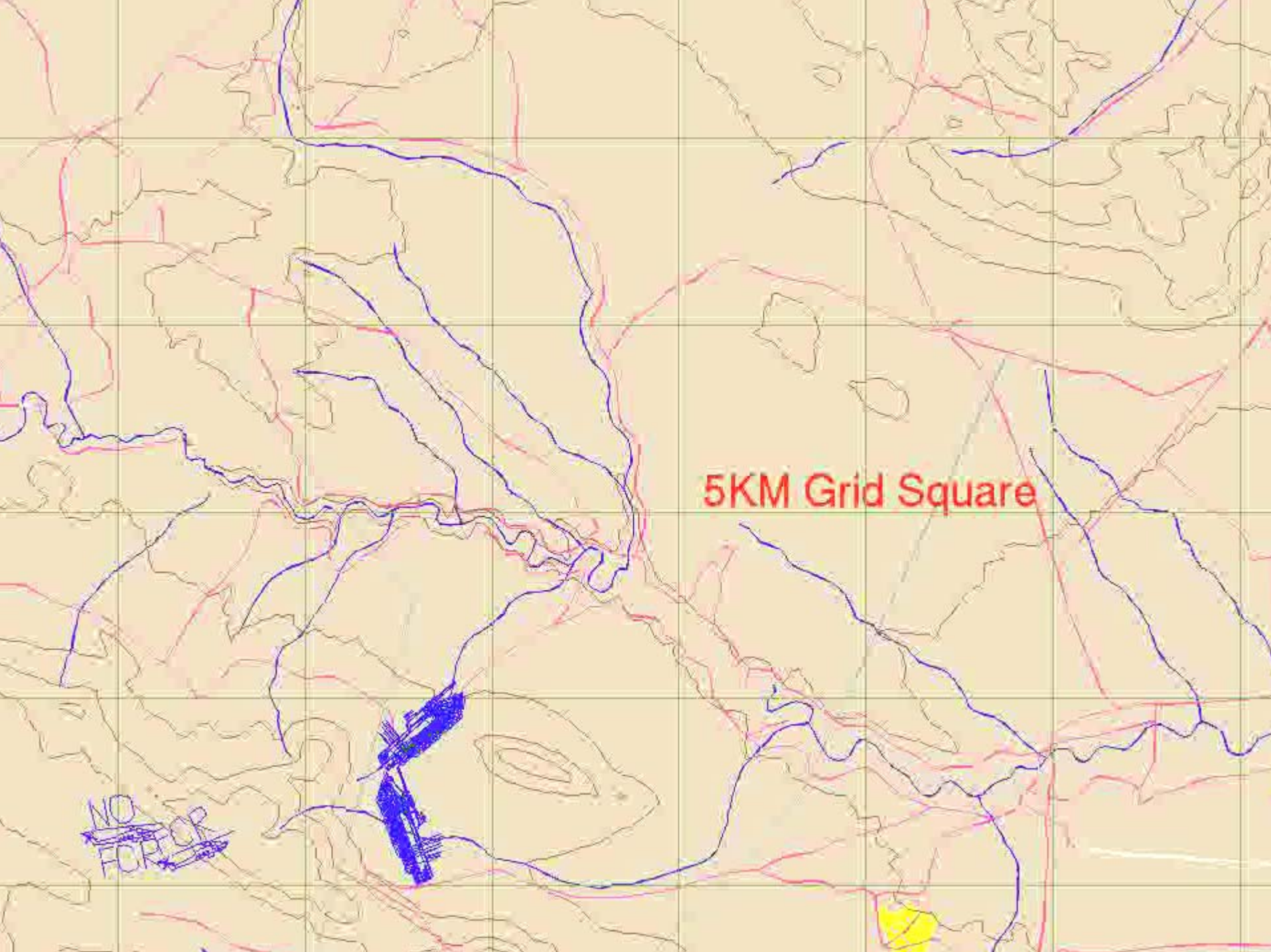


Initial Forces – Ground Truth

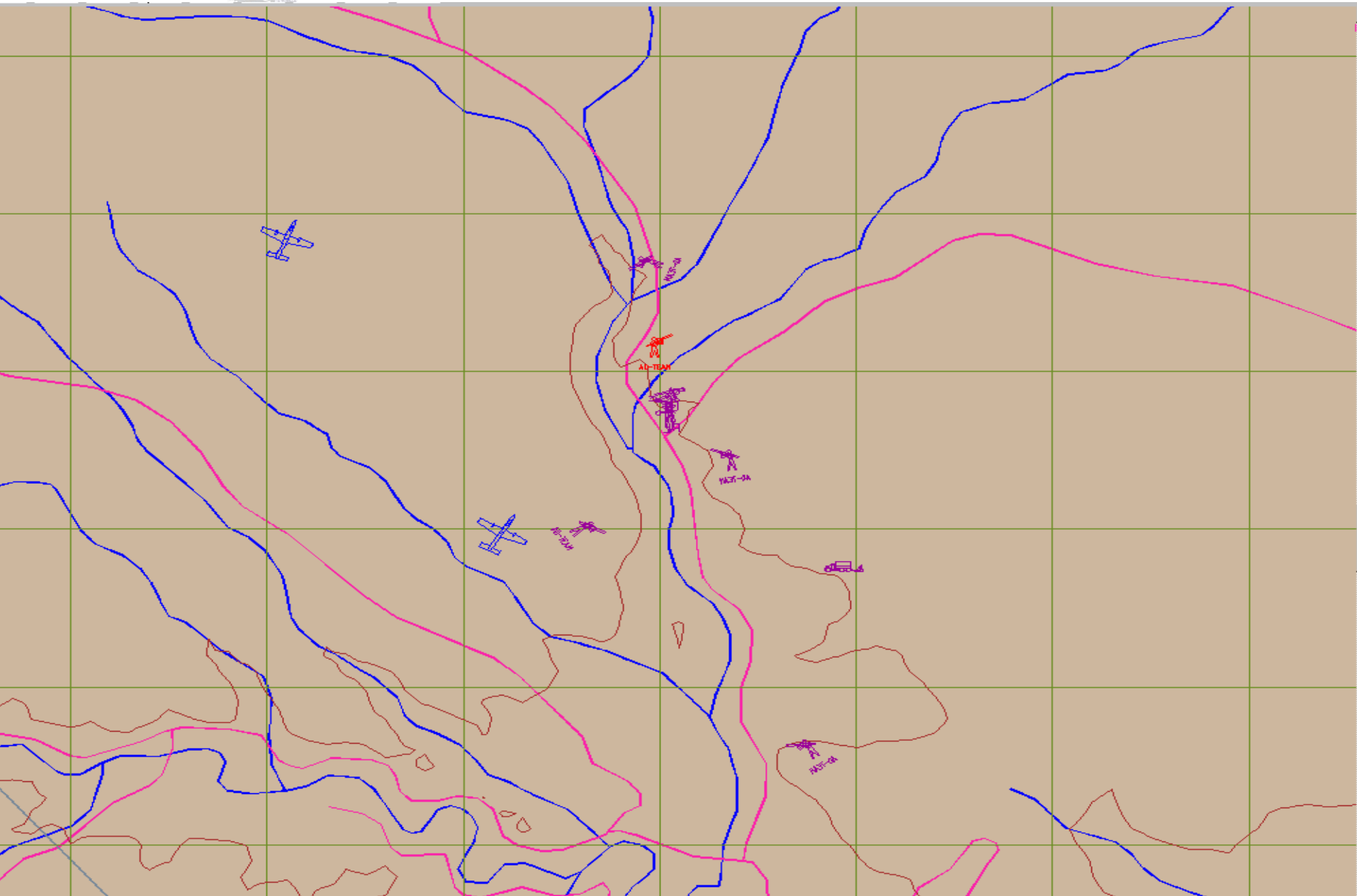


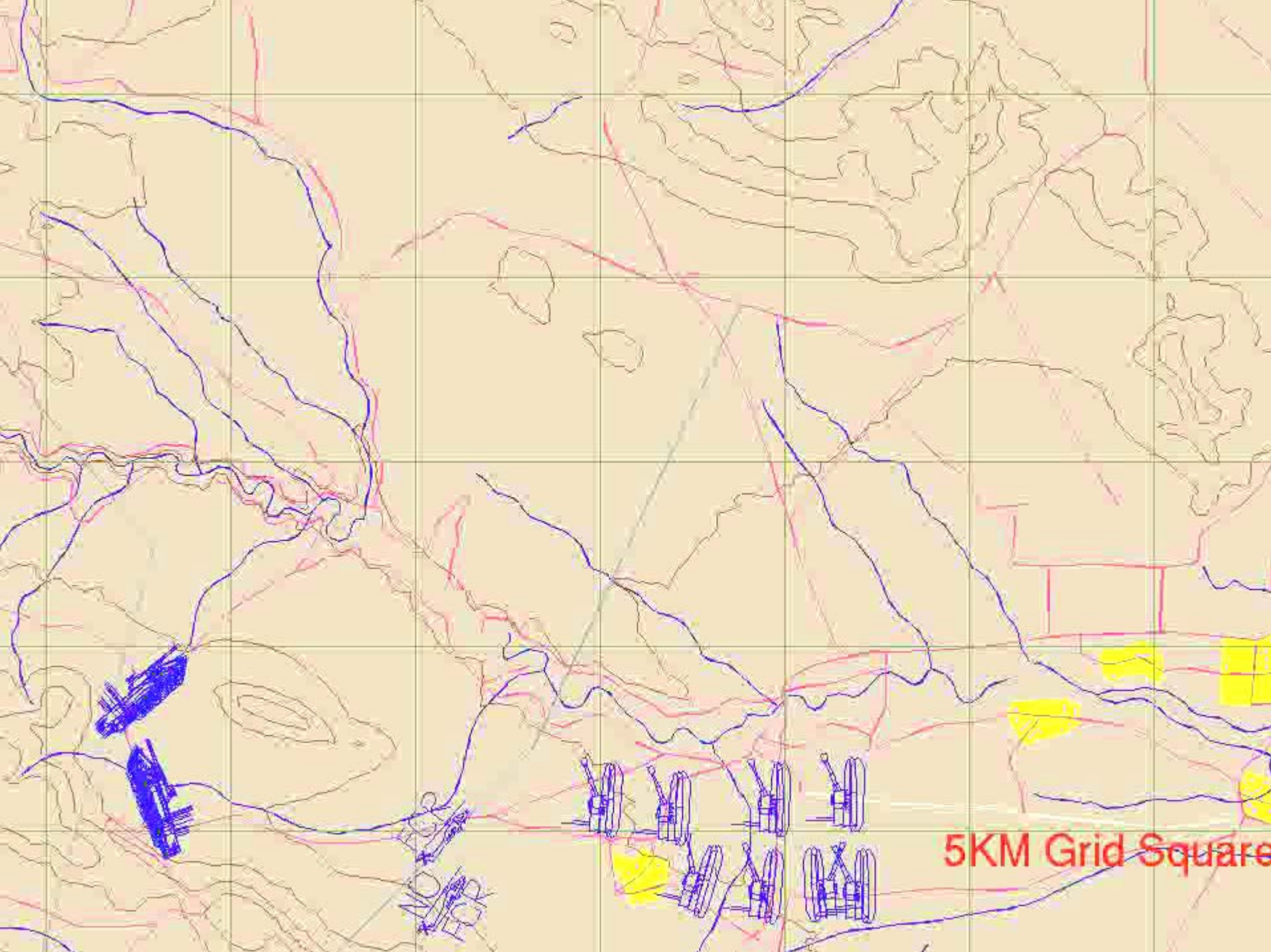
Blue Forces – No Networking – No Engagements




5KM Grid Square

With Networking – No Engagements

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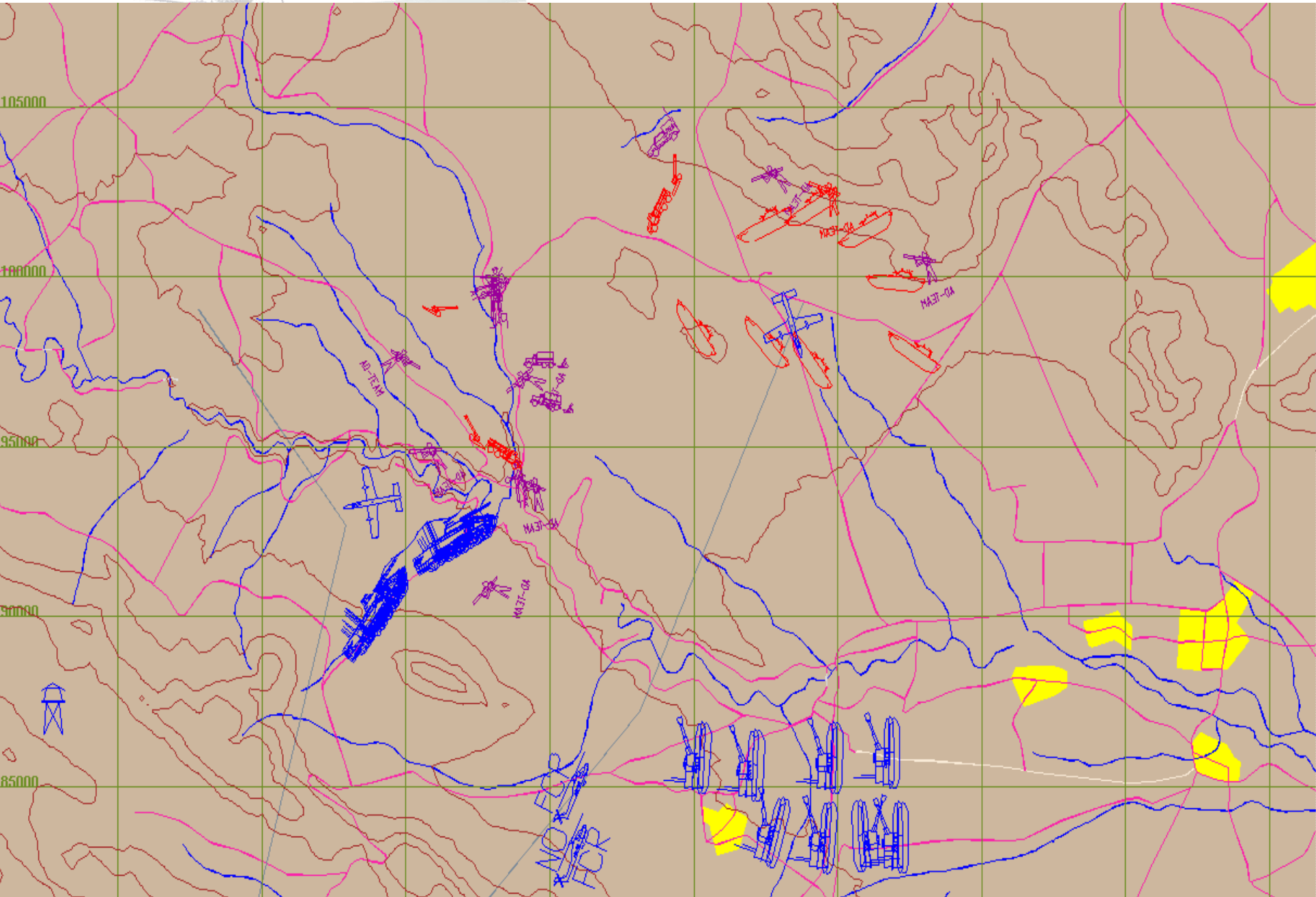
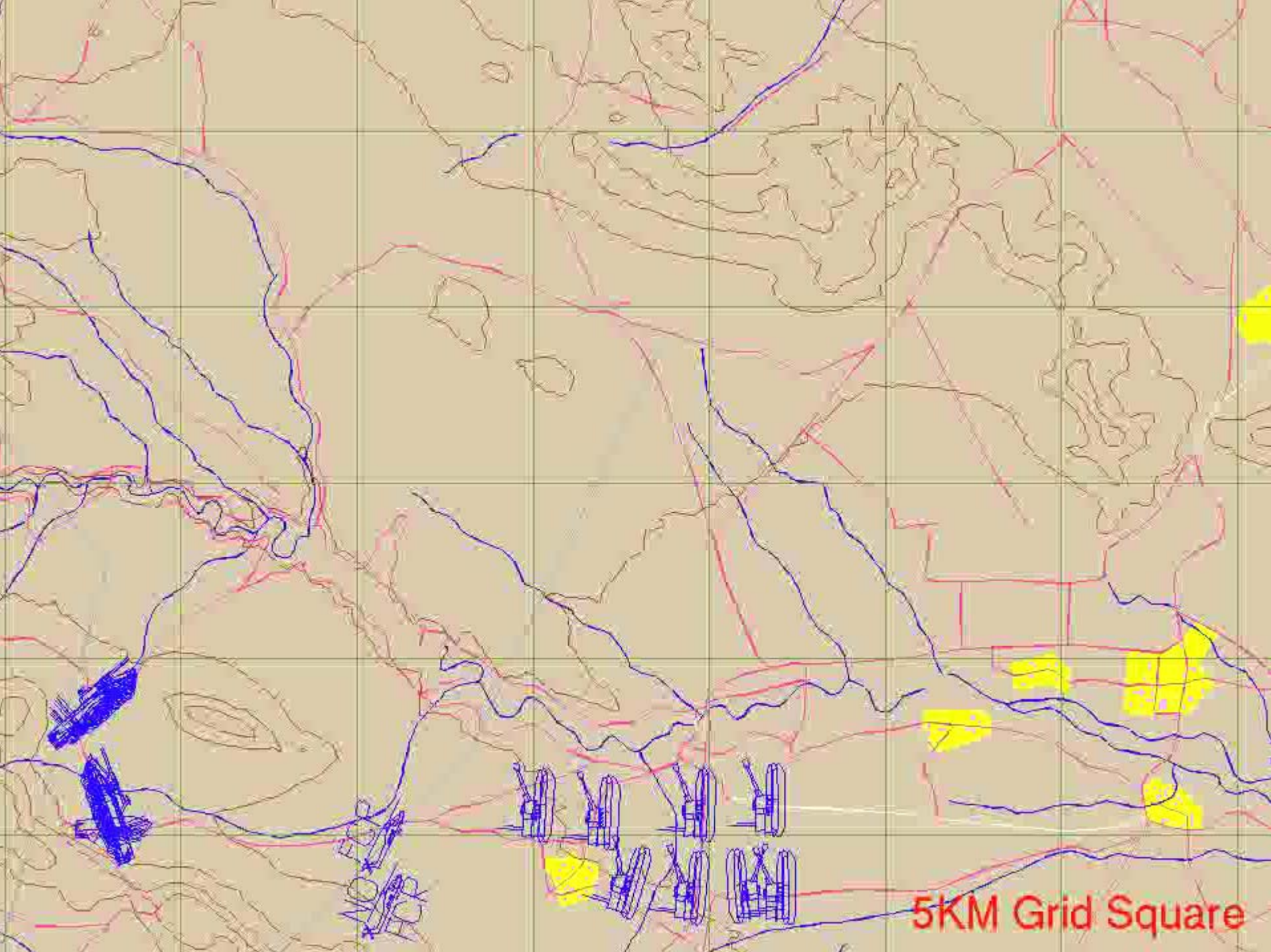
With Networking and Engagements

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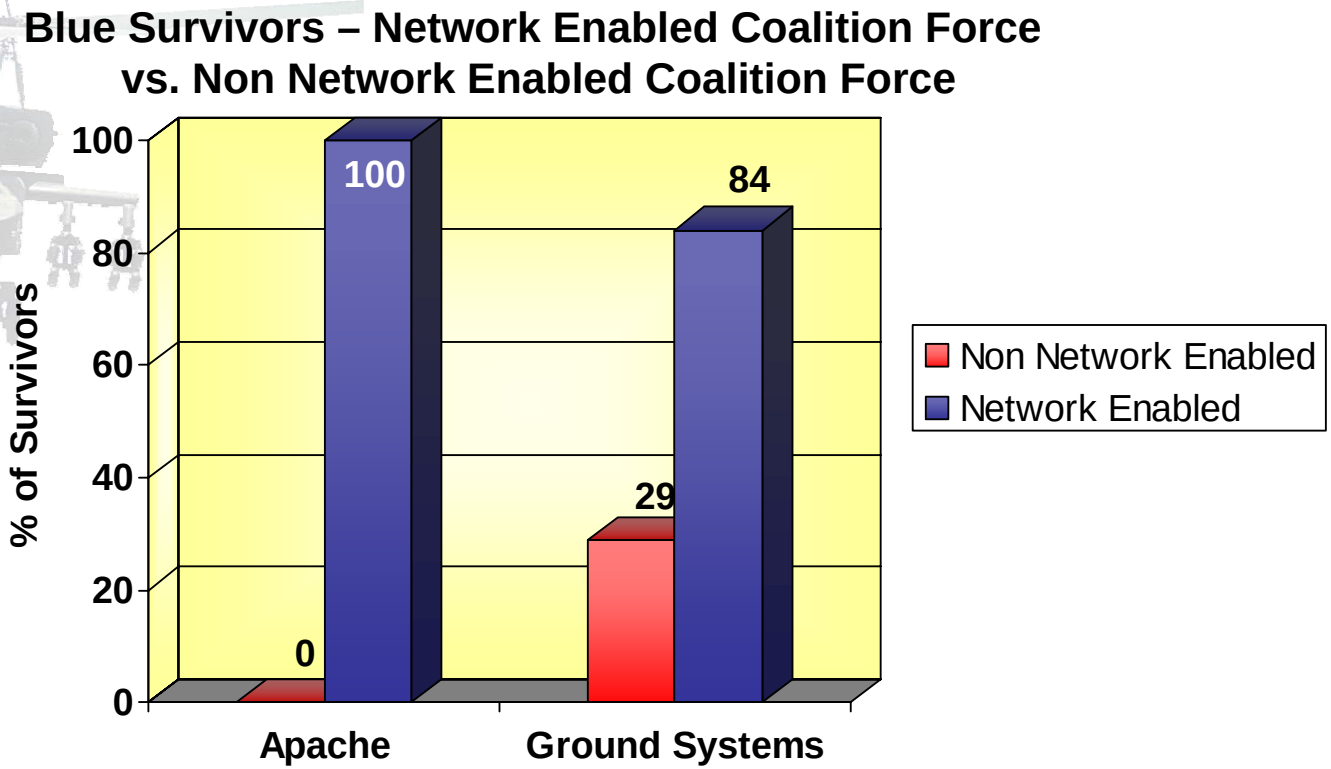
Mission Effectiveness – Movement to Contact

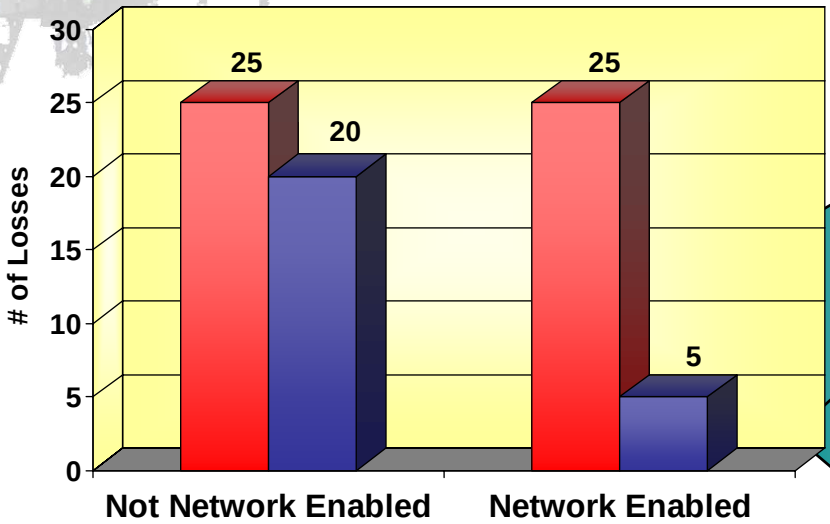


Results

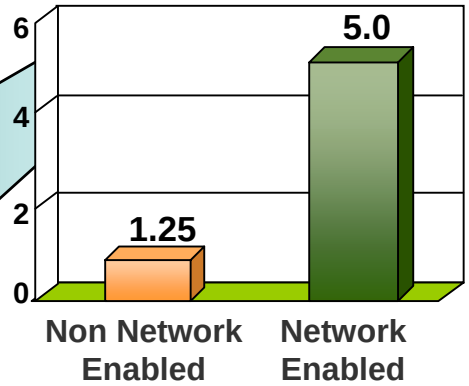
- Network Enabled Coalition Ground Force 2.9 Times More Survivable
- All Network Enabled AH-64D Survive
- No Non Network Enabled AH-64D Survive
  - AH-64Ds should have never moved into area west of OBJ IRON, since no Stryker threats were in that area
  - Blue did not know this without prior SA from networked UAVs

Mission Effectiveness – Close Combat

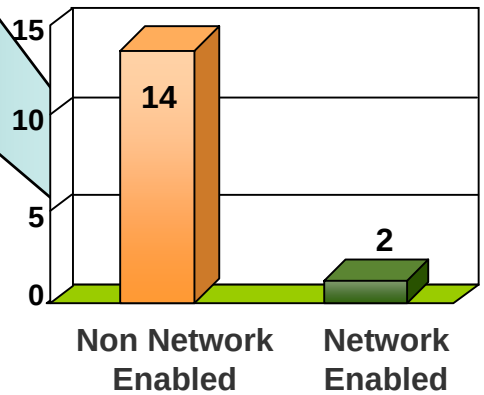
Red vs. Blue Losses – Network Enabled Coalition Force vs. Non Network Enabled Coalition Force



Force Loss Exchange Ratio (Red Killed/Blue Killed)



Blue Ground Force Losses



Results

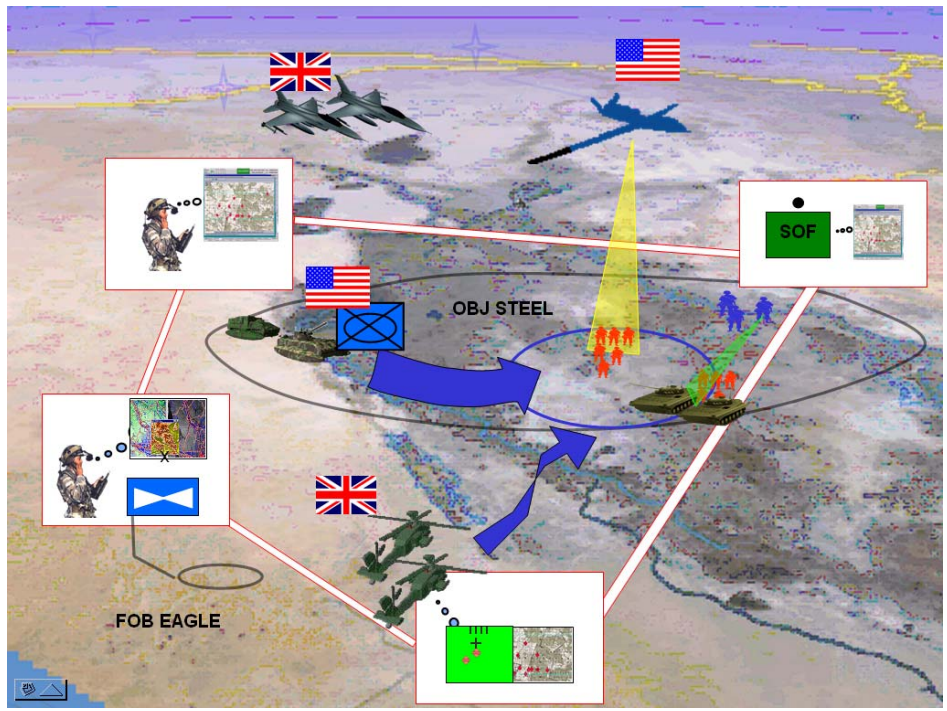
- Network Enabled Coalition Force Loss Exchange Ratio 4 Times Greater
- Network Enabled Ground Force 7 Times More Survivable

Mission Effectiveness – Insights

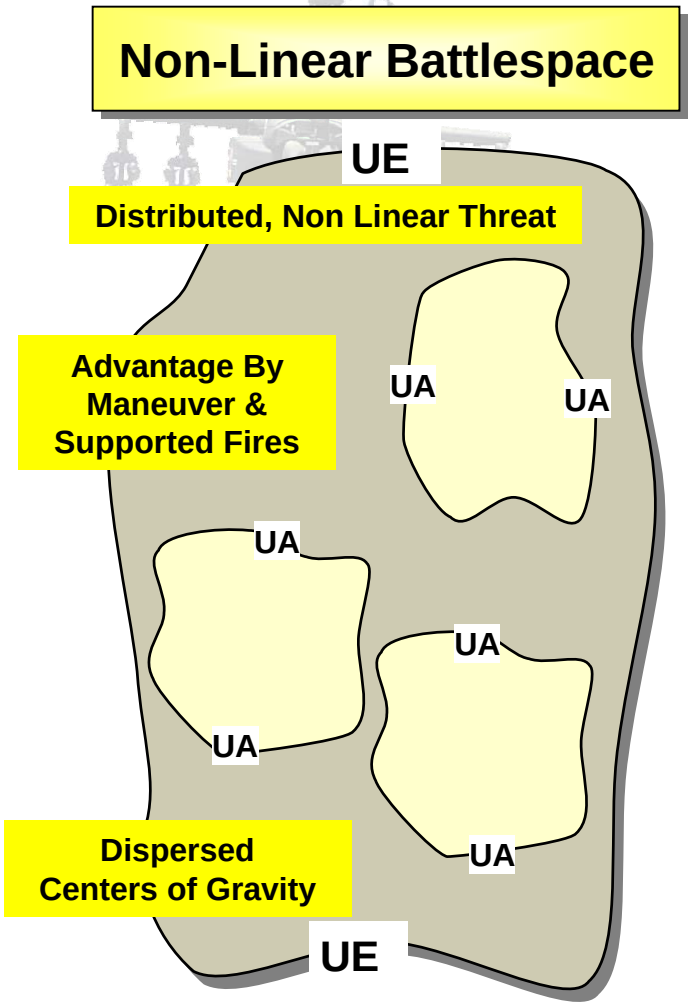
- **Interoperability Enables the COP and Provides Shared Battlespace Visualization**
- **COP Provides *Actionable Combat Information* & Enhances Synchronization**

Allows the Commander to . . .

- ✓ **Develop Situation Out of Contact**
- ✓ **Employ Precision Fires to Protect the Force**
- ✓ **Decrease the Intensity of the Ground Fight**
- ✓ **Use Combined Arms Operations for Mutual Support**



20xx Operational Construct



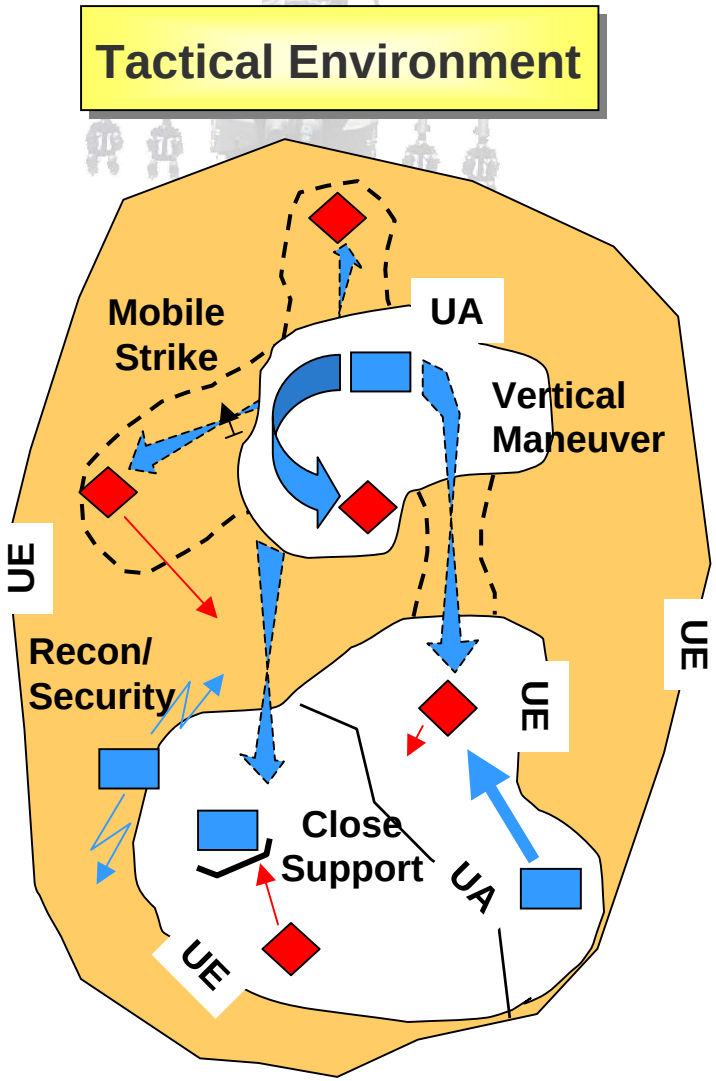
- Dispersed pattern-less threat in time/space -- some threats echeloned; most not
- Multiple simultaneous defensive - offensive fights that mix mid/high-intensity conventional with asymmetric fights
  - Operations throughout AO against dispersed, highly mobile, "high value" ground targets to reduce or eliminate threat options
  - Systems employed -- long range rockets, Joint fires, ISR and Army aviation
  - Depth of operations not determined by linear threat template array -- greater breadth and depth required throughout Battlespace
  - Close operations remain decisive
  - Permissive/non-permissive controls evolve
- Simultaneous deployment & employment
- Intermixed contiguous & non-contiguous AOs (Somalia, Bosnia, Panama, OEF, OIF)

Conclusion

- Network enabled Coalition Forces are more effective
- Forces must share actionable combat information
  - Shared view of the battlespace
  - Shared understanding
  - Intuitive action
- Analysis of alternative configurations may require interactive combat simulations, especially for decisions involving dynamic allocation of ISR and Effector assets based on information provided by NCO in the asymmetric environment

Back-up Slides

Apache in the Future Force Construct



Environment – Simultaneous Operations Throughout the Area of Influence Against Dispersed, Highly Mobile, High Value Targets to Reduce or Eliminate Threat Options.

Missions

- ✓ Recon/Security
- ✓ Precision Engagement – Mobile Strike
- ✓ Close Support – Direct Support to Maneuver Forces
- ✓ Vertical Maneuver – Armed Escort

Capability – Flexibility, Survivability and Lethality through Sensors, Information and Decisive & Dominant Firepower.

Future Force Enabler – Attack/Recon Aviation Enables the Future Force to Dominate the Entire Battlespace Throughout the Spectrum of Conflict

Future Force Apache Roles & Missions

Role - Attack

Missions/Tasks

- ✓**Precision Engagement - Mobile Strike**
  - ✓Acquire/engage and destroy key enemy forces & capabilities with friendly forces out of contact
  - ✓Enhance & Share COP
  - ✓Manned/Unmanned Teaming
- ✓**Close Support – Direct Support to Maneuver Forces**
  - ✓Acquire/engage and destroy key enemy forces & capabilities with friendly forces in contact
  - ✓Build & share COP

Role – Recon/Security

Missions/Tasks

- ✓**Reconnaissance/Security**
  - ✓Find/Fix Threat Forces
  - ✓ Build & Share the COP
  - ✓Manned/Unmanned Teaming
- ✓**Vertical Maneuver – Armed Escort**
  - ✓Provide reaction time, maneuver space, and protection to air element
  - ✓Build & Share the COP

Apache Information Exchange Requirements

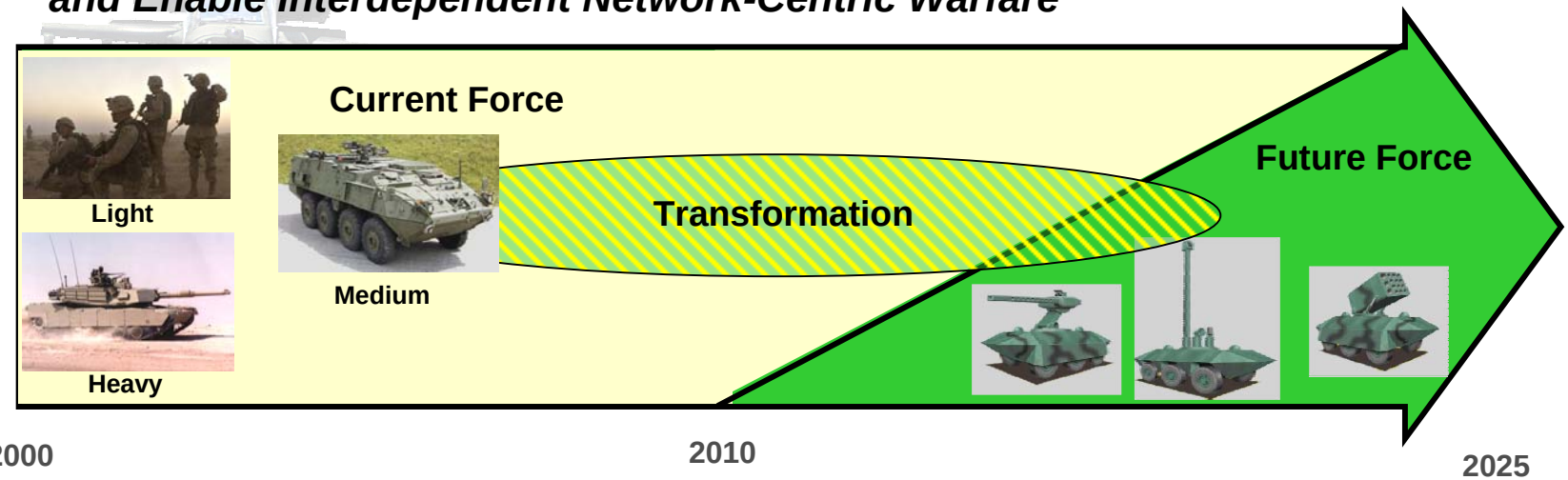
- Enemy Situation
- Friendly Situation
- Orders and Graphics
- Observation Reports/Combat Information
- Remote Sensor Tasking/Control
- Imagery/Video
- Combat Identification
- Survival
- Battle Damage Assessment/Indication
- Status
- Air Traffic Services/Control

Exchanged with . . .

- Air Ground Maneuver Team
  - Current Force
  - Legacy Force
  - Joint Forces
  - Allied Forces
  - Coalition Forces

Evolving Army Transformation

Fully Networked Battle Command Capabilities Bridge From Current Force and Enable Interdependent Network-Centric Warfare



Force XXI DIV ⟷ BDE Units of Action (BCT) ⟷ BN Units of Action

Command Environment

Corps/DIV	Division/Brigade	Brigade/Battalion

Technology Enablers

Initial Battle Command
- SINCGAR/EPLRS
- ABCS
- NDTR
- Dependent Unmanned Systems

Enhanced Battle Command
- BFT
- JTRS Block I/II
- WIN-T
- Semi Autonomous Unmanned Systems

Fully Networked Battle Command
- SOSCOE
- JTRS Block III
- Objective Force Warrior
- Autonomous Systems